

Remarks

Claims 1-29 are pending in the subject application. Applicants acknowledge that claims 5, 7, 11-17, 22, 23, and 25-27 have been withdrawn from further consideration as being drawn to a non-elected invention. By this Amendment, Applicants have canceled claims 12-17, 26, and 27, amended claim 29, and added new claims 30-34. Support for the new claims and amendments can be found throughout the subject specification, including, for example, at page 32, line 2 of paragraph 000167, and in the drawings as filed. Entry and consideration of the amendments presented herein is respectfully requested. Accordingly, claims 1-11, 18-25, and 28-34 are currently before the Examiner. Favorable consideration of the pending claims is respectfully requested.

As an initial matter, Applicants note that the Examiner indicates that claims 7 and 25 are drawn to non-elected species. Applicants respectfully assert that the claims are drawn to the elected species of the dendrimer substrate, *i.e.*, isocyanates. Claims 7 and 25 recite a specific formula for the isocyanate species. Thus, these claims are still drawn to the elected species. If the Examiner wanted a subspecies of isocyanates to be elected, then such a requirement should have been set forth in the Restriction Requirement. Accordingly, Applicants respectfully request that claims 7 and 25 be rejoined and considered in the examination of the subject application.

Claims 1-4, 8-10, 18-21, 28, and 29 are rejected under 35 USC §103(a) as obvious over Malik and Wang (WO 00/11463) in view of either Kim *et al.* (U.S. published application No. 2002/0020669) or Neumann *et al.* (German Patent No. DE 19,621,741). Claims 6 and 24 are rejected under 35 USC §103(a) as obvious over Malik and Wang (WO 00/11463) in view of either Kim *et al.* (2002/0020669) or Neumann *et al.* (DE 19,621,741) and further in view of Newkome *et al.* (U.S. Patent No. 5,703,271). The Examiner asserts that it would have been obvious to modify the column disclosed in the Malik and Wang publication to include a dendrimer given that the Kim *et al.* publication teaches that dendrimers bonded on supports are economically feasible, versatile, and useable in chromatography and also because the Neumann *et al.* patent teaches that the use of dendrimers increases the number of functional groups, thereby improving separation. The Examiner further asserts that it would have been obvious to use isocyanate in a column disclosed in the Malik and Wang publication in view of Kim *et al.* or Neumann *et al.* because the Newkome *et al.* patent teaches that isocyanate dendrimers have the flexibility of reacting with various chemical surfaces

including siloxane and can be used in “column chromatography or the like for selective removal of agent from the material flowing through the column.” Applicants respectfully traverse these grounds of rejection.

Applicants respectfully assert that the references cited by the Examiner, whether taken alone or in combination, do not teach or suggest Applicants’ claimed invention. Specifically, none of the cited references, including the primary reference by Malik and Wang, teach or suggest the use of dendrimers in sol-gels. One important requirement in column preparation by the sol-gel approach as taught by the Malik and Wang publication is that the organic ligand to be attached to the chromatographic substrate must be sol-gel active. In general, dendrimers are not sol-gel active, and therefore, an ordinarily skilled artisan, having considered the cited references, would have been discouraged from using dendrimers for the preparation of sol-gel columns. Both the Kim *et al.* publication and the Neumann *et al.* patent teach the preparation of modified dendrimers but fail to teach whether such derivatized dendrimers are sol-gel active. Without that information, an ordinarily skilled artisan would have been discouraged from using such modified dendrimers for the preparation of sol-gel columns. Thus, the cited references do not provide motivation to use dendrimers in sol-gel applications and, in fact, teach away from such use.

In addition, the Kim *et al.* publication teaches the preparation of silicone modified dendrimers *via* derivatization of a portion of the dendrimer’s exterior functional sites (*i.e.*, those on the crown of the dendrimer) using a silane, siloxane, or silicone functionality, and subsequent immobilization of the dendrimer using silane chemistry on its silicone modified portion. Therefore, the Kim *et al.* publication essentially teaches how to chemically bind a dendrimer to a chromatographic substrate by its crown (rather than by the root of the dendrimer). Such a binding mechanism leads to undesirable orientation of the dendrimers on the substrate and fails to provide maximum exposure of the chromatographically active functional groups on the dendrimer crown to analytes being passed through the column. In contrast, in the present invention, the focal functional group (*i.e.*, the one on the root of the dendrimer - not the ones on the exterior or crown of the dendrimer) is derivatized, thereby providing very different structural features compared with the silicone derivatized dendrimers in the teachings of the Kim *et al.* publication. These structural differences between derivatized dendrimers of the present invention and those taught by the Kim *et*

*al.* publication also lead to far-reaching differences with respect to the point of their attachment to the chromatographic support as well as in the spatial orientation of the dendrimer molecules and the effectiveness of their interaction with various analyte species in a separation column or in an extraction column. The dendrimers of the present invention are attached to the chromatographic support by the root, thereby making the chromatographically active functional groups on the dendritic canopy readily available for chromatographic interactions with the analytes ensuring enhanced performance in chromatographic separations (when used in a chromatographic column) or in extraction (when used in an extraction column). By comparison, the Kim *et al.* publication teaches derivatization of the exterior functional sites on the dendrimer which leads to undefined spatial orientations of the dendrimer in a separation column, thereby greatly limiting the availability of the chromatographically active functional groups in the dendrimer for interaction with the analyte molecules. Because of these structural, functional, and spatial orientation differences, the sol-gel based columns of the present invention are very different from those described by the Kim *et al.* publication.

As the Examiner is aware, it is well established in patent law that in order to support a *prima facie* case of obviousness, a person of ordinary skill in the art must find both the suggestion of the claimed invention, and a reasonable expectation of success in making that invention, solely in light of the teachings of the prior art. *In re Dow Chemical Co.*, 5 USPQ2d 1529, 1531 (Fed. Cir. 1988). In the instant case, there is no suggestion in the cited references to use dendrimers with a sol-gel substrate. Although the references may disclose that dendrimers could be used to improve separation in chromatography, there is no teaching or suggestion to use dendrimers with sol-gel substrates, nor is there any teaching or suggestion as to how one would make or use the dendrimers with sol-gel substrates in chromatography. Moreover, even if one assumes, *arguendo*, that the cited references suggest the use of dendrimers with sol-gel substrates, such would only make the use “obvious to try.” It is well settled in patent law that “obvious to try” is not the proper legal standard for a *prima facie* case of obviousness under 35 USC §103. *In re Geiger*, 2 USPQ2d 1276 (Fed. Cir. 1987). Rather, the cited references must also provide a “reasonable expectation of success” in arriving at Applicants’ claimed invention.

Accordingly, reconsideration and withdrawal of the rejections under 35 USC §103(a) is respectfully requested.

It should be understood that the amendments presented herein have been made solely to expedite prosecution of the subject application to completion and should not be construed as an indication of Applicants' agreement with or acquiescence in the Examiner's position.

In view of the foregoing remarks and amendments to the claims, Applicants believe that the currently pending claims are in condition for allowance, and such action is respectfully requested.

The Commissioner is hereby authorized to charge any fees under 37 CFR §§1.16 or 1.17 as required by this paper to Deposit Account No. 19-0065.

Applicants invite the Examiner to call the undersigned if clarification is needed on any of this response, or if the Examiner believes a telephonic interview would expedite the prosecution of the subject application to completion.

Respectfully submitted,



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